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Children's metaphoric productions and preferences*

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ABSTRACT

The capacity to perceive similarity between apparently dissimilar domains is widely regarded as crucial to creative thought; yet little is known about the development of this 'metaphoric' skill. To assess children's capacities to effect appropriate 'metaphoric links', and to discriminate among metaphors of varying appropriateness, a task probing verbal metaphoric skill was designed. Subjects ranging in age from 4 to 19 years were required to complete a simile and then to choose from a set of four similes the one most appropriate for a given literary context. The study documented a tendency, increasing with age, towards preference for an appropriate metaphor. Whereas primary school children preferred non-metaphoric endings and pre-adolescents favoured conventional metaphors, high school and college students showed significant appreciation of appropriate metaphors. In contrast, conventional metaphors predominated in the subjects' productions and appropriate metaphors were rarely produced by subjects of any age group. Unexpectedly, the highest percentages of appropriate metaphors were produced by the youngest subjects and the oldest subjects. Where these two groups differed was in the proclivity of young subjects to produce metaphors which were highly original but inappropriate or nonsensical. The various strategies used by subjects of different ages are described and the relations between metaphoric productions and preferences are considered.

INTRODUCTION

Transporting an element customarily associated with one context to a second, with which it has not usually been associated but where it nonetheless is appropriate, is a capacity central to creative thought (Koestler 1964, Ghiselin 1955, Getzels & Jackson 1962). The workman who devises a new use for a familiar tool; the scientist who reinterprets established data from a fresh perspective; and, above all, the poet who juxtaposes hitherto remote phrases into a stunning figure of speech are all engaged in such METAPHORIC thought. While the desirability of this cognitive capacity has been widely acknowledged (Bruner 1962, Guilford 1959), relatively little is known about its natural development or about procedures for fostering it (Gordon 1961, Wallach & Kogan 1965). In this report we examine the development of a paradigmatic instance of metaphoric thought, the capacity to create and to appreciate unusual yet appropriate figures of speech. Information about this ability can enrich understanding of the evolution of language after fundamental linguistic structures have been mastered, illuminate the growth of skills central to the artist and clarify the relationship between the abilities to appreciate and to produce original conceptualizations.

The metaphoric capacity of the young child has yet to be determined. The conventional view (Asch & Nerlove 1960) holds that only the adolescent or pre-adolescent can appreciate that 'dual meaning' of a term which permits its metaphoric application. Yet it has been observed that pre-schoolers utter many figures of speech which would be considered metaphoric, were they created by adults (Weir 1962, Carlson & Anisfeld 1969, Gardner 1973, Chukovsky 1968). In an effort to ascertain the metaphoric capacity of younger children, Gardner (1974) required subjects of different ages to match pairs of stimuli drawn from different sensory modalities (e.g. two colours, two sounds) with antonymous pairs of adjectives (e.g. *happy–sad, hard–soft*). Even the pre-school child proved able to make such 'metaphoric matches' at better than chance level and pre-adolescents performed as well as college students in effecting the 'correct' match. When REASONS for the matches were analysed, however, the conventional view that young children fail to appreciate the dual meaning of metaphoric terms was confirmed.

Because the earlier study required a forced choice, and involved matching of words with nonverbal elements, it failed to illuminate the development of the capacity to produce and perceive verbal figures of speech. Information on this topic can be gleaned if subjects are given opportunities to create figures of speech and to select the most appropriate from a number of figures of speech. Two contrasting outcomes of such an investigation are conceivable. On the one hand, as young children create many figures of speech and display little tendency to censor their spontaneous output, it is possible that there may be a decline in metaphoric capacity across age. On the other hand, since metaphoric thinking

involves the rejection of the familiar in favour of the unusual, and since older children have gained familiarity with many patterns still foreign to younger children, a shift towards metaphoric thinking in later years also seems plausible. In the present study children of different ages were required to complete a vignette and then to select one of four possible endings. The endings were actually similes, but they will be described by the generic term metaphor. The study was so designed as to provide information on the following questions:

1. Will children produce appropriate metaphoric figures when given the opportunity to do so? Does the tendency to create a metaphor increase with age? What are the characteristics of non-metaphoric endings?

2. Are children likely to prefer a metaphoric figure when given multiple choices? Does this tendency increase with age? Can a 'metaphoric set' increase the probability of a metaphoric response? What reasons do children offer for their preferences?

In addition to providing quantitative information on these questions, the study also illuminated the reasoning processes involved in metaphoric and non-metaphoric thinking and the relative plausibility of the rival hypotheses sketched above.

METHOD

Subjects

Eighty-four subjects, an approximately equal number of males and females at each of four age levels (modal and median ages 7, 11, 14 and 19 years) participated in the study. The subjects were volunteers selected from their school classrooms, except in the case of the oldest group, which was composed of paid college undergraduates. Social class background was mixed, but predominantly middle-class, as determined from parents' occupations.

In addition to these subjects, 47 pre-school children, aged 3 or 4 years, participated in an abbreviated version of the study. Methods and results from this group are discussed separately.

Materials

Eighteen very short stories were devised. The story always ended with an unfinished sentence which the subject was asked to complete. Four possible endings for each story were also devised; these were related to the subject after he had formulated his own ending.

Each of the eighteen stories was written in three forms. The first (Form S) was simply a short declarative statement which was incomplete, e.g. *He looks as gigantic as....* In the second version (Form N) the incomplete sentence was

preceded by two full 'neutral' sentences, e.g. *We're glad to have you at this party for our son. Look at that boy standing over there. He looks as gigantic as . . . .* The third version (Form M) was identical to the N form except for the initial sentence, which was a general statement designed to encourage the production and selection of a metaphoric ending, e.g. *Things don't have to be huge in size to look that way. Look at that boy standing over there. He looks as gigantic as . . . .*

The N and M forms were equated in length so that effects of length and metaphoric encouragement could be independently assessed. It was hypothesized that an ending which contained a general statement and which developed its own context (Form M) would be more likely to elicit a metaphoric ending than one which was brief (Form S) or which failed to direct the subject to the wider implications of the subject matter (Form N).

Each of the eighteen basic stories featured a different adjective. Included were six common descriptive adjectives (Group 1: *soft, dark, quiet, short, cold, sad*); their antonyms (Group 2: *hard, light, loud, tall, warm, happy*); and an adjective related in meaning to Group 2 but somewhat stronger and less commonplace than those of Groups 1 and 2 (*stony, bright, thundering, gigantic, boiling, pleased*). It was hypothesized that metaphors were more likely for the third, less familiar and more exotic set of terms.

For each of the eighteen stories, four endings were devised. The endings differed in their appropriateness (suitability to the literary context) and in their originality (likelihood of being produced). Always included were one LITERAL (or non-metaphoric) ending (which merely repeated the adjective in the story); a CONVENTIONAL ending (which was appropriate but familiar and of scant originality); a metaphorically APPROPRIATE ending (transporting the adjective to a realm where it was not ordinarily applied but where, in the present context, it was appropriate); and a metaphorically INAPPROPRIATE ending (transporting the adjective to a realm where it was not ordinarily applied and where, moreover, it was not appropriate). In so far as possible the endings were equated in length. Here are the four endings for the story quoted above:

LITERAL: *as gigantic as the most gigantic person in the whole world*

CONVENTIONAL: *as gigantic as a skyscraper in the centre of town*

APPROPRIATE: *as gigantic as a double-decker cone in a baby's hand*

INAPPROPRIATE: *as gigantic as a clock from a department store*

Three structurally identical versions of the test were constructed and one-third of the subjects in each age and sex group received each version. Through the use of three versions, all eighteen adjectives appeared an equal number of times with each of the three introductions. Each version of the test consisted of eighteen stories, six each of the S, M and N forms. Each subject heard one member of

each adjective trio (e.g. *soft*) with an S beginning, the second member (e.g. *hard*) with an M, the final member (e.g. *stony*) with an N. Across the three versions each adjective appeared once with each of the introductions: across the study each version of each story appeared an equal number of times. Because the results on the three versions were almost identical, they have been combined in the present report. Finally, each of the three versions of the test was divided into thirds (items 1–6, 7–12, 13–18). Each pre-school subject received one of these sets of six items. Therefore, all of the 54 possible items appeared once for each group of nine pre-school subjects.

Within each version of the test, items were presented in random order. Half of the subjects began the test with the first item of this randomly generated series, the remaining subjects with the final item. A tabular summary of the experimental design is presented in Table 1.

Procedure

After entering the experimental room, each subject was told *I am going to read you a short story. The story doesn't have an ending. I want you to listen to it carefully and then make up an ending which you like and which you think sounds right for the story.* The subject was then given a practice item. After completing the practice item, he was told: *Now, I've brought along some endings which we made up. Please listen to these endings very carefully. Afterwards I want you to select the ending which you like the best and which fits the story.* The subject heard a set of endings and these endings were always repeated before a choice was requested. After he had selected an ending, the subject was asked for his reasons. If a subject was reluctant to give an ending, or a reason for his preference, he was encouraged to speak through the use of non-directive comments (e.g. *I'm really interested in your reasons... I'd really like to hear your ending*).

After a few practice items the subject was asked to paraphrase the procedure for the story-completion task. If he evinced any confusion, additional practice items were administered. No subject commenced with the test items until he demonstrated an understanding of the procedure. Except for a few of the pre-school subjects who required extra practice items, the procedure posed no problems for any of the subjects. Subjects were not allowed to say *the first* or *the last ending* but were always asked to quote or paraphrase the ending. If they were unable to do so, the four endings were repeated.

The eighteen items were administered to the four older age groups in two or three sessions spread out over a week's time. The pre-school subjects heard their six items at one or, occasionally, two sessions.

Scoring

Subjects' preferences were coded as either L (literal), C (conventional), A (appropriate) or I (inappropriate) and the total number of each of these prefer-

TABLE 1. *Number and type of items presented to each subject*

Subject group	Stories to be completed	S beginnings	N beginnings	M beginnings	Common adjective, group 1	Common adjective, group 2	Less familiar adjectives
Pre-school	6	6	Varied but never more than 3 of any type				
Older subjects	18	6	6	6	6	6	6

NOTE: There were three versions of the test. Across the three versions, each adjective appears with each beginning once, and all possible versions of each story were heard once.

preferences was computed. The subject's own endings were scored on the same basis (as either L, C, A or I) by two independent judges who did not know the age or identity of the subject. Endings were considered metaphorically appropriate only if they met at least one of the following criteria: (a) the adjective was projected on to a sensory domain where it was not literally applicable and the resulting metaphor was not a familiar English cliché. Thus, if an adjective ordinarily associated with the visual sense (e.g. *dark*) was applied to the domains of sound or touch, the subject was given credit for an appropriate metaphor; (b) the adjective which was typically associated with the physical world (e.g. *cold*) was projected on to a psychological state (e.g. a feeling, a thought) or the reverse (e.g. *pleased* applied to a physical object); (c) the adjective remained in its customary domain (sense modality or physical reference) but a radical shift in perspective was required (e.g. in the above example, the word *gigantic* is applied to an ice-cream cone). So long as the underlying rationale for the metaphor was an established or familiar one, inclusion of a novel word or phrase did not qualify it as appropriate. On occasion these guidelines did not prove adequate but overall the judges achieved 0·90 agreement in their assessment of metaphors. In the case of disagreement, the equivocal case was discussed until agreement was reached.

RESULTS

Metaphoric preferences

A series of non-independent 2×4 (sex $\times$ age) analyses of variance were performed on the number of literal, conventional, appropriate and inappropriate endings preferred by each of the four groups who took the whole test. There was a sharp decrease across ages in the number of literal endings preferred by subjects ($F = 33·29$, d.f. $= 3, 76, P < 0·001$); a decrease as well in the number of conventional endings ($F = 5·93$, d.f. $= 3, 76, P < 0·01$); a striking increase in the number of appropriate endings ($F = 28·79$, d.f. $= 3, 76, P < 0·01$); no significant differences in the number of inappropriate endings ($F < 1$). As can be seen in Fig. 1, the inappropriate endings were almost never selected by any subject at any age.

Each of the four age groups exhibited a dominant response or responses. Literal responses were the most popular with 75 % of the 7-year-olds: conventional responses were most frequently selected by 71 % of the 11-year-olds; conventional responses were favoured by 50 % of the 14-year-olds, while appropriate ones were favoured by 40 % of that age group; appropriate responses were favoured by 53 % of the 19-year-olds, while conventional responses were favoured by 47 % of this oldest group.

A strikingly different configuration of preferences occurred with the youngest subjects. Of the 281 preferences indicated by the 47 subjects, 19 % were literal, 21 % were conventional, 22 % were appropriate and 38 % were inappropriate.

A one-way repeated-measures analysis of variance indicates a significant difference across the four kinds of endings within this age group ($F = 2\cdot81$, d.f. $= 3$, 138, $P < 0\cdot05$). However, a Newman–Keul post-hoc comparison of means indicates no significant difference among the means. Of the 34 subjects who chose one type of ending more than the others, 4 preferred the appropriate ending, 6 the literal, 11 the inappropriate and 13 the conventional. In the face of this mixed evidence, it seems most parsimonious to conclude that there were no systematic trends in the preferences of the younger subjects. It is probable that most of the youngest subjects were selecting randomly among the endings, though fourteen did show a consistent (four out of six) preference for one type of ending.
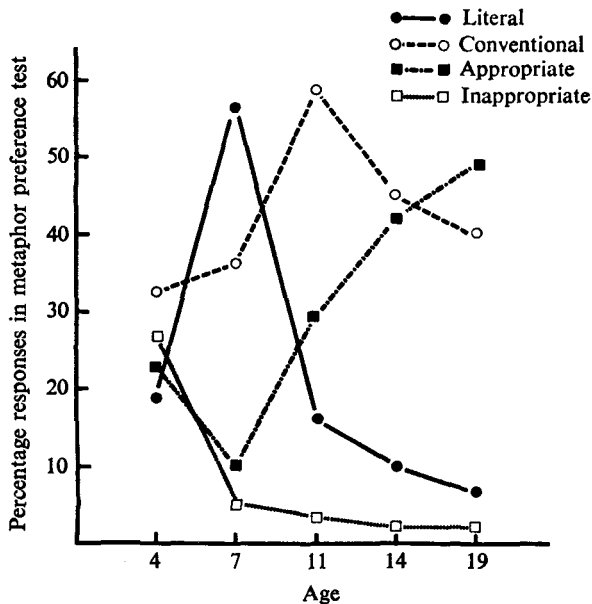

Fig. 1. Percentages of literal, conventional, metaphorically appropriate and metaphorically inappropriate endings chosen by subjects in the preference portion of the test.

Metaphoric productions

As documented in Fig. 2, the overwhelming proportion of productions at each age level were classified as conventional; statistical analysis revealed no significant difference in the number of conventional responses produced by the four older subject groups. Because the capacity of subjects to produce appropriate metaphoric responses was of particular interest, this variable was further analysed.

A one-way analysis of variance revealed a significant difference in the number of appropriate responses produced by the four oldest subject groups ($F = 2\cdot91$,

d.f. $= 3, 83, P < 0.05$). A Newman–Keuls post-hoc comparison of means pointed up a significant difference between the performance of the oldest subjects and the two younger subject groups (ages 7 and 11). Wholly unexpected was the relatively large number of appropriate metaphors produced by pre-schoolers: the youngest subjects formed the highest percentage of metaphors in the study.

Comparisons including the youngest groups are not completely legitimate, because each pre-schooler heard only six stories. Accordingly, many of these young subjects produced no appropriate metaphors on the six trials, but might well have produced some if permitted the usual number. Yet, if the performances of the pre-schoolers are to be compared with the oldest groups, their scores must be multiplied by three; this, in turn, produces at best a rough estimate of their ability.
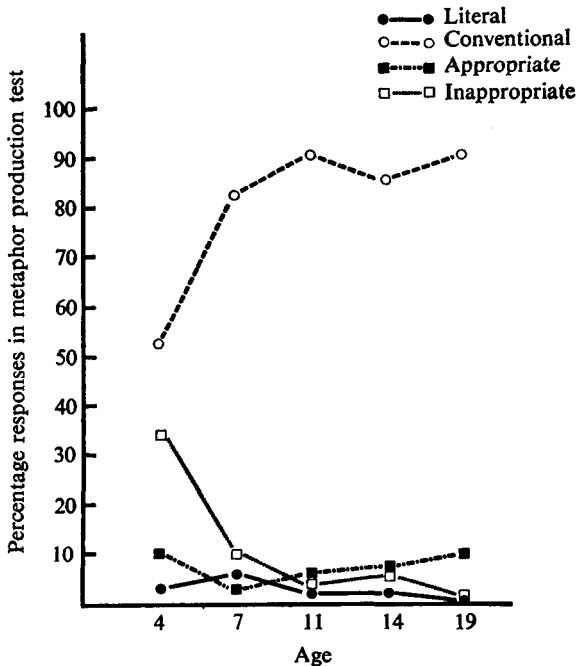
Fig. 2. Percentages of various responses given by subjects in the production portion of the test.

Nonetheless, in order that the capacity of the pre-schoolers to produce appropriate metaphors might be compared with the older subjects, each score of the former group was multiplied by three. A one-way analysis of variance indicated that the difference across the five groups approached but did not quite reach significance ($F = 2.11$, d.f. $= 4$, 130, $P < 0.08$). The failure to reach

significance seems due primarily to the large individual variation within the youngest group. When the three younger groups (ages 4, 7 and 11) were compared alone, there was a significant difference among them ($F = 3\cdot22$, d.f. $= 2$, 94, $P < 0\cdot05$). Moreover, a Newman-Keuls post-hoc comparison revealed that the youngest group produced significantly more appropriate responses than the next youngest group ($P < 0\cdot05$). The percentage of subjects at each age group forming at least one appropriate metaphor was also computed. Despite the fact that the measure was biased against them, the pre-schoolers turned in a creditable performance. 40 % of the pre-schoolers, 37 % of the 7-year-olds, 54 % of the 11-year-olds, 54 % of the 14-year-olds and 56 % of the 19-year-olds produced at least one appropriate ending. Taken together, these results indicate a slow but steady increase with age in the number of appropriate metaphors produced in this task, except for the youngest subjects, who gave an absolutely higher percentage of appropriate responses than any other group. However, it must be emphasized that, while constituting but a tiny minority of the older subject groups' responses, inappropriate responses were quite frequent among the pre-schoolers.

Quantitative data on subjects' preferences and productions was supplemented by an investigation of the behaviours and strategies commonly employed by subjects at each age level.

Pre-schoolers

The discrepancy between preferences and productions was striking at this age level. Each type of ending was chosen frequently, and most subjects divided their choices among the endings. When asked for their reasons, the subjects tended either to state that they did not know or to provide a rewording of the ending chosen. The frequent selection of inappropriate endings reflected an imprecise comprehension of certain adjectives: for example, numerous subjects selected the ending *tall as string*, perhaps because tallness was equated with length; similarly, an object might be considered *stony as a walk in the park after church* perhaps because of an association with a stony path.

Most of the subjects' productions were short and conventional, e.g. *cold as snow, tall as a giant*. Animals and midgets were especially popular figures in these responses. Inappropriate productions again reflected lack of adequate comprehension of the adjective and/or the story: there was also some confusion among opposites (*warm as snow*), some mechanical repetition of the same ending for each story, a few non-verbal responses, and several personal references (*as tall as you, as happy as Elizabeth*). Yet, as noted above, there was a surprisingly high number of appropriate endings, e.g. *weather as boiling as your head popping open, sad as a pimple, quiet as a magic marker, soft as a rainbow, stony as a stupid person*. These appropriate endings usually came within a few seconds of the telling of the story, suggesting that the metaphoric link was a spontaneous one,

rather than one arrived at as a result of a lengthy deductive process or choice among several generated alternatives. The young subjects may have produced appropriate metaphors because conventional responses are less likely to vault to mind; they are more willing to follow their sensory imagination, and to throw caution to the winds.

Seven-year-olds

This age group was literal, concrete and conservative in its approach to the task. The majority of subjects preferred the most literal ending, because they felt that the 'best' ending was the one which expressed the adjective in most extreme form, and which was therefore most impervious to challenge. Many subjects rejected a conventional or appropriate ending in favour of a literal one because the latter best exemplified the property under consideration: *I didn't choose 'as boiling as a teapot whistling' because that's less boiling than 'the most boiling thing in the world'*. Reasons were generally concrete: *tall as trees because trees are really big, warm as toast because it gets real hot in the toaster*. Even when appropriate endings were chosen, concrete and non-metaphoric reasons were invoked, e.g. *the face of the prison guard is stony, because the prison has stone walls*. There was a reluctance (or inability) to project human feelings on to physical objects or to adopt a relativistic set: *a double-decker cone can't be gigantic because I'm taller than a cone*. Idiosyncratic or personal reasons were offered: *light as a feather because I like feathers*.

The subjects' productions, while reflecting the same trends, yielded a different response profile. Where literal endings were generally preferred, conventional endings were usually produced. These endings may have been sufficiently familiar and accessible that subjects produced them spontaneously, yet felt tempted to select a literal ending when required to make and defend a choice. The conventional endings were usually simple: *soft as a pillow, bright as the sky* but a few subjects created some more elaborated conventional endings, *as bright as a light light yellow you can't see*. Appropriate and inappropriate endings were rare, with the inappropriate endings reflecting either miscomprehension or irrelevant verbal associations to the target adjective.

Eleven-year-olds

This age group preferred the conventional endings as strongly as the seven-year-olds favoured the literal endings. In general, the literal endings were rejected because *that doesn't say anything new* or *I like* (the conventional one) *better*, while the appropriate endings were rejected as inadmissible: *a colour can't be loud, an ice-cream cone isn't gigantic*. Most subjects were comfortable with their preferences and offered at least one cogent reason for a choice (e.g. *a pillow is nice and soft when you sit in it, just like that* (gentle object) *over there*). Some subjects selected appropriate endings and invoked reasons which suggested an incipient

awareness of metaphoric links. For instance, in justifying *as stony as a guard's face*, one subject collapsed the individual with an object: *the guard would look at you like a statue, very very stern*; another 'anthropomorphized' a tree, declaring *the tree is sad because it's the last day of autumn and there is no one else around.* Such collapsing of boundaries between the physical and the psychological indicated increasing acceptance of the plausibility of a metaphoric comparison.

Both the endings made and the reasons invoked to defend them remained, for the most part, quite concrete. However, simple conventional endings were complemented in this age group by an equal number of embellished conventional endings, e.g. *strong as a gigantic boulder sticking in the ground.* In contrast to the idiosyncratic personal references found among younger subjects, this age group incorporated appropriate proper names, e.g. *tall as Wilt Chamberlain, happy as a Stanley Cup winner.* The few endings scored as appropriate were based on a significant departure within the same sensory modality (*the object was as hard as stale bread*) more often than on a shift across sense modalities or the physical-psychological boundary (*sad as a squished tomato*).

Fourteen- and nineteen-year-olds

Trends which had commenced in a few pre-adolescents characterized most of the oldest subjects. Both conventional and appropriate endings were frequently chosen by members of these age groups. Subjects often proposed more than one reason for their choices and usually made explicit comparisons between the alternatives offered them. When the metaphoric endings were rejected, it was often because a subject felt that the metaphor was not exactly right (*the sun has the connotation of colour, while a rocket ship could be bright or dark*) or because of a reluctance to cross traditional semantic boundaries (*I don't like to talk about colours as loud, though I suppose you could do that*). Metaphoric endings were also rejected when the subjects had themselves produced the conventional ones which were subsequently offered them. On the other hand, when the metaphoric ending was accepted, the subjects generally gave plausible reasons. The college students, in particular, alluded to 'middle terms' – intermediate or relativistic concepts which joined the usually disparate realms: *a splash of red can be thundering because it breaks out noisily in the centre of the paper* or *usually an ice-cream cone isn't that big but in the hands of a little child I guess it would be gigantic.* There were also frequent references to the greater 'poetic', 'aesthetic' or 'original' flavour of the appropriate metaphor.

As for production, conventional endings remained extremely popular at this age group. But in a clear majority of cases, the conventional endings were elaborated: *warm as a summer's night in Montana, colours as light as the pastel colours in Van Gogh.* Indeed, 10% of the conventional endings were sufficiently elaborated and interesting (e.g. *stony as a hockey puck, boiling as hot lava coming down a mountain volcano, thundering as the President making a speech on television*)

as to suggest the utility of an additional category of classification called 'vivid comparisons'. Yet as these 'vivid comparisons' could be reliably distinguished from successful cross-modal metaphors (*colours as light as an old folk tune*) and from an unfamiliar comparison within the same sensory modality (*colours as bright as pomegranates in a coal mine*), the former were considered conventional endings. Only among this age group were there explicit attempts to realize the implication of 'metaphoric-encouraging' beginnings. Finally, the few endings judged inappropriate seemed to reflect careless failure to qualify responses (*hard as rubber, stony as clay*) rather than a lack of understanding of the words or the task.

Item analysis

Comparison of performances on the preference portion of the test revealed a regular pattern across ages. The most popular metaphoric endings were *warm as the smile of a friend you haven't seen for a year* and *colours as dark as an old house where no one has lived for years*. Perhaps this acceptance reflects, in the first case, a rather familiar cross-modal comparison, and in the second, a metaphor which does not require the mixing of sensory modalities. The metaphors least often preferred were *thundering as a splash of red on a white piece of paper*, *loud as the red dress on that 300-pound lady*, and *cold as a stingy old man who won't help a beggar*: in the first two cases subjects were required to join two quite distinct categories – colour and sound, a link which many were reluctant to countenance. The most favoured conventional endings were the familiar and intuitively evident *loud as thunder can be during a thunderstorm* and *thundering as a big crowd of noisy people*. Least often chosen were *warm as toast early in the morning* and *happy as a lark that I saw this morning*; both of these are rather contrived and less intuitively evident conventional phrases which may indeed have been unfamiliar to the subjects.

Other analyses

The less familiar adjectives tended to produce more metaphoric endings than the common antonyms but this trend was not statistically significant: only in the case of the college subjects did the 'metaphor-encouraging beginnings' produce a higher incidence of metaphoric endings than the other two beginnings ($\chi^2 = 17.54$, d.f. $= 2$, $P < 0.01$).

DISCUSSION

The trends discerned in the subjects' metaphoric preferences are consistent with the sizeable literature on subjects' aesthetic and perceptual preferences (Berlyne 1971, Child 1969, Munsinger & Kessen 1964, Kagan & Lewis 1965). Younger subjects tend to prefer the modest novelty of a literal or conventional ending and

to reject metaphoric endings, presumably because they cannot assimilate such discrepant stimuli. Older subjects, already familiar with conventional or literal endings, are more likely to spurn these in favour of the more novel (hence more interesting) metaphoric endings. The greater cognitive sophistication of the older subjects enables them to appreciate the links between the disparate realms (Zigler, Levine & Gould 1966, McGhee 1971); even when younger subjects prefer metaphors, their reasons generally belie an explicit appreciation of the reason for the metaphors' appropriateness. It is possible that the very youngest subjects also have some appreciation of metaphors, for they preferred the metaphoric endings in 22% of the cases. Yet the absence or inappropriateness of reasons, considerable scatter across scores, and imprecise comprehension of the meaning of the words dictate caution in interpreting the preferences of these subjects.

While preferences are best interpreted in the light of supporting reasons (Gardner 1973: chapter 5), productions can more reasonably be judged on their own merits. Again, with reference to the subjects aged 7–19 years, the results are expected. Conventional endings are produced in overwhelming numbers by the youngest subjects; these endings are favoured among older subjects as well, but become increasingly embellished and 'vivid'. Only among the older adolescent subjects are there significant numbers of metaphoric endings, and of these, most involve an original comparison within the customary sensory modality rather than a linking of disparate realms or modalities. The paucity of metaphoric endings is probably due in part to the time constraints and the unfamiliarity of the task; pilot work (Gardner & Winner, unpublished research) suggests that, with a modest amount of training, pre-adolescents can significantly increase their metaphoric production. Yet the reluctance of many older subjects to embrace metaphors, even when given the opportunity to do so, and their occasional insistence that one cannot compare colours with sounds or feeling with hearing, indicate that the appreciation of metaphor is far from universal even among educated middle-class subjects.

The performances of the pre-schoolers are somewhat anomalous inasmuch as this group produced an absolutely higher number of metaphors than any other age group. To some extent this surprising precocity may simply reflect incomplete knowledge of the meaning of a word: if one is unaware that the word *hard* has as its primary reference a tactilely perceived material, it may be easier to speak of a *hard face* or a *hard sound*. This attribution of the metaphoric productions of pre-schoolers to inappropriately over-generalized lexical markers gains in persuasiveness from the large number of inappropriate endings found at this age group. And yet the present data are equally consistent with the interpretation that young children possess the ability to cut across the customary categories of description and comparison (cf. Gardner 1974), to appreciate usually undiscerned links among realms, to respond affectively in a parallel

manner to events which are usually categorized differently, and to capture these original conceptions in words. The tendency of these subjects to avoid hackneyed comparisons (because they are not yet well established) is further documented by the relatively infrequent preferences for the conventional ending in the preference portion of the task. And an examination of the specific appropriate endings produced by these subjects strongly suggests that, far from being accidental productions, the subjects evince genuine awareness of a legitimate connection between realms. Taken together, the evidence suggests that at least some young subjects indeed possess a genuine metaphoric capacity; what they lack is the critical 'blue-pencil' ability which enables older subjects to reject those endings which, while unusual, are not appropriate for the context, or whose appropriateness remains to be fully realized.

The findings suggest the following general picture of the development of metaphoric capacity. Among the youngest subjects, analytic ability is very limited; this uncriticalness results in irrelevant reasons, random choices when given several alternatives and frequent inappropriate responses. Yet these same subjects, reflecting perhaps an insufficiently delineated lexicon and a heightened capacity to appreciate novel relations, are more likely than somewhat older subjects to produce appropriate metaphors. Subjects at the primary school level are highly concrete and literal in the approach to the task, representing a low point in both the appreciation and the production of metaphor. From this age onward, there is a rather rapid trend towards conventional and eventually metaphorically appropriate preferences, and a slower but equally persistent trend towards more metaphoric productions. The oldest subjects generally display an explicit appreciation of metaphor, often prefer metaphoric endings, have some capacity to produce vivid comparisons if not always to shift across domains, and the critical ability lacking among the youngest subjects. They alone possess the metalinguistic flair of reflecting upon the words of others, and of considering what is appropriate in a given context.

The appearance among adolescent subjects of a large number of elaborated conventional endings and 'vivid comparisons' deserves brief comment. It seems probable that these subjects are earnestly seeking to produce figurative language which is unusual yet appropriate. Indeed, when contrasted to the hackneyed formulas characteristic of most younger children, these responses emerge as relatively effective linguistic expressions. And yet, such responses still differ in a fundamental way from those produced by more sophisticated subjects. The kernel idea of the 'vivid comparison' remains a familiar comparison, while the appropriate metaphor features a decisive shift across sensory realms or from the physical to the psychological domain. It therefore seems most legitimate to regard these figures, common only among one age group, as transitional practices; while signalling an imminent command of metaphor, they can – and should – be differentiated from appropriate metaphors. Recent pilot work using paradigms of

this sort (Gardner & Winner, unpublished) indicates that subjects producing transitional figures of this sort are most susceptible to training.

The study provides further information on the perplexing relationship between preferences and productions in the arts (Gardner 1973). From one point of view the trends on the two tasks are quite similar, in that there is a regular shift towards metaphoric proficiency in both production and preference between 7 and 19 years. This shift can be attributed to increased cognitive sophistication, more intimate acquaintance with the literary medium, and a taste for materials which are less familiar and more interesting. Yet two considerations modify this simple parallel between the two processes.

First, there is the relatively large number of appropriate metaphors produced by the younger subjects. If replicated, this finding suggests that a production capacity can have developed to a more advanced level than is implied by the individual's preferences or explanations. Perhaps in the arts, as Gombrich (1960) has argued, 'making' precedes 'matching'; accordingly, the child's productive capacities require separate analysis.

The second discrepancy from the simple parallel between production and preference arises from the subjects' relatively strong attraction to metaphor on the preference test. Whereas over half of the endings preferred by the older subjects were metaphoric, the overwhelming number of endings produced by these and other subjects were conventional or literal. The greater difficulty of the production task, the constraints of time and the novelty of the task, certainly account in part for the results. Yet it is also possible that some factor(s) in the developmental or educational process militates against the production of original and metaphoric endings. Specifically, while the capacity to produce unusual (whether appropriate or inappropriate) endings clearly exists among younger subjects,[1] subjects may become convinced that they should not produce such atypical responses; instead they should behave cautiously, selecting a response which is more commonplace, less distinctive, 'safer'. Whether the production of metaphoric endings is a genuine (though suppressed) option for the older subjects or, alternatively, a capacity which has atrophied because of discouragement or increasing lapsing into a familiar mode, is a question susceptible to research; such study should help to illuminate further the relation between the relatively competent level of perception, and the generally dismal level of production in the arts.

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[1] It also exists among older subjects. A small number of college-age students who participated in the study after smoking marijuana created more appropriate and more inappropriate endings than did their peers described in this report.

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